MATHEMATICS AND STATISTICS
COLLOQUIUM ANNOUNCEMENT

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3:30 to 4:30 PM
ARTS 213

SPEAKER

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TITLE:
Quasiconvexity and Morrey conjecture

Abstract:

Let f be a continuous function defined on $\mathbf{R}^{n\times m}$, and let $\Omega \subseteq \mathbf{R}^n$ be an open bounded domain. Consider an energy functional $I_f(u) = \int_\Omega f(Du)dx$, where $u \in W^{1,p}(\Omega, \mathbf{R}^m)$, $u \equiv u_0$ on $\partial\Omega$. The fundamental problem in the Calculus of Variations is to find the minimizer of I_f. Morrey proved in 1952 that in the case $p = \infty$ the functional I_f admits a minimizer if and only if f is *quasiconvex* i.e. it satisfies the following Jensen-type inequality: $\fint_\Omega f(A+D\phi(x))dx \geq f(A)$ for an arbitrary matrix A, whenever ϕ is a smooth mapping compactly supported in Ω. This general condition is typically hard or impossible to verify. At the same time, quasiconvexity implies the so-called *rank-one convexity condition*, which is convexity along rank-one matrices. However, in 1952 Morrey conjectured that these two notions, rank–one convexity and quasiconvexity, are probably not equivalent in general. His conjecture was confirmed in 1992 by Šverák in dimensions $n \geq 2$, $m \geq 3$. My purpose is to discuss more recent developments in this area. The discussion will be partially based on my own results.